

The Past and Future of AstroPAH Research and the Diffuse Interstellar Bands

Farid Salama, Ella Sciamma-O'Brien, Salma Bejaoui

NASA Ames Research Center, Space Science & Astrobiology Division, USA.

farid.salama@nasa.gov

Here, we present a critical assessment of the PAHs as DIB Carriers and discuss the progress and the advances that have been achieved so far through a series of complementary studies involving astronomical observations of DIBs, laboratory simulation of interstellar analogs for PAHs (neutrals and ions), space exposure experiments of PAHs, theoretical calculations of PAH spectra and the modeling of diffuse and translucent interstellar clouds. We will discuss what we have learned from these complementary studies, the constraints that can be derived from these studies for the PAHs as DIB carriers and the future studies that are required to address the open questions. These involve extending the laboratory and astronomical PAH-DIB studies from the NUV-Visible range into the NIR and MIR domains where DIBs have also been observed and developing tools in the laboratory to help generate more complex, PAH-related species for comparison with astronomical data. For the laboratory part, we will present the COSmIC facility at NASA-Ames that provides experimental conditions that closely mimic the interstellar conditions and helps address these issues. The comparison of astronomical data with laboratory data measured under realistic conditions is the only way to derive clear and unambiguous conclusions regarding the expected abundances for PAHs of various sizes and charge states in interstellar environments. From the observational aspect we will explore the new opportunities offered by JWST to connect the DIBs to MIR PAH emission and to search for NIR DIBs that may trace the presence of PAHs.

References

- A Critical Review of PAHs as DIB Carriers - Progress and Open Questions, Farid Salama & Pascale Ehrenfreund in *The Diffuse Interstellar Bands*, Proc. IAU, Vol. 9, S297, J. Cami & N. Cox, eds. 364 (2014) <http://dx.doi.org/10.1017/S174392131301613X>
- Polycyclic Aromatic Hydrocarbons and the Diffuse Interstellar Bands. A Survey Farid Salama, G. Galazutdinov, J. Krelowski, L. Biennier, Y. Beletsky, and In-Ok Song, *The Astrophys. J.*, 728, 154 (2011) [10.1088/0004-637X/728/2/154](https://doi.org/10.1088/0004-637X/728/2/154)